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EXAMINER	
WERNER, BRIAN P	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/032,272	SONG ET AL.	
	Examiner	Art Unit	
	Brian P. Werner	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 May 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9 and 13-45* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 13-45* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 6 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. The amendment/remarks and IDS received on May 13, 2003 have been entered. An initialed IDS is attached. Claims 1-9 and 13-45 are now pending. The previous claim objections are withdrawn.

Response to Arguments

2. Each of the remarks and/or arguments filed with the aforementioned amendment have been considered:

Claim Objections:

Summary of Applicant's Remarks: Claims 7 and 8 have an antecedent basis in claim 1.

Examiner's Response: Examiner agrees, the objection was erroneous and is hereby withdrawn.

102 Newman Rejections:

Summary of Applicant's Remarks: "Applicants assume the Examiner intended to assert Newman under 5 U.S.C. 102(b) or will do so in the future".

Examiner's Response: Examiner disagrees. Newman (US 6,321,596 B1) is relied upon for its filing date of April 21, 1999, and is thus a 102(e) reference. Newman does not meet the statutory criteria as a 102(b) reference.

Summary of Applicant's Remarks:

"Newman does not teach an image grabber generating an image of the tubing", and

"instead of generating an image of the tubing, the data acquisition device 207 is actually generating numerical data representing the rotational orientation of the coiled tubing" (both at response page 10).

Examiner's Response: Disagreed. Newman discloses a system for measuring characteristics of coiled tubing as it is employed into or extracted out of a will (e.g., column 3, line 19). It is true that Newman discusses different types of sensors that may be used, some of which generate "numerical data" such as the "Hall Effect" sensor at column 5, line 54. However, Newman describes at various places in the specification how other sensors can be used. For example, Newman states that "it is within the scope of this invention to employ one or more of any known suitable sensors as discussed above" (column 5, line 56), and "a sensor 100 (as described above) senses rotation" (column 6, line 43). The sensor "above" that Newman is referring to, and the

sensor upon which the examiner was (and is) relying, is the "camera(s)" described at column 3, line 45. Newman states that the "rotational orientation of the line, lines, or dots is monitored visually, with optical scanning device(s), or with camera(s) and the location from which amount of rotation can be calculated ... electronically" (column 3, line 45). Thus, Newman is teaching that the rotation is calculated from optical images of the markings on the tubing. Now, given that the sensor signal, in this case a camera image, is sent directly to device 207 is figure 3, then device 207 is equivalent to a frame grabber in that it grabs/stores images for subsequent electronic processing. Stated another way, "device 207" grabs signals from sensors and sends them to the main computer 210 as described at column 6, lines 45 and 56. Thus, device 207 meets the criteria of a frame grabber when image signals from the cameras are generated.

Summary of Applicant's Remarks: "Newman does not teach a program in the processor analyzing the image to detect predetermined features of the tubing segment", and "Newman only analyzes digital numerical data ... [and] does not analyze an image at all" (response page 10).

Examiner's Response: Firmly disagreed. Newman captures cameras images of markings on the coiled tubing in order to determine a tube's rotation "electronically" (i.e., column 3, line 47). Given that Newman teaches a computer that performs the requisite calculations (i.e., figure 3, numeral 210), and given that Newman teaches the electronic calculation of a tube's rotation from images of markings on the tubing (i.e., "rotational orientation of the line, lines, or dots is monitored visually, with optical scanning

device(s), or with camera(s) and the location from which amount of rotation can be calculated ... electronically" at column 3, line 45), and given that a computer (such as Newman's) is programmed by a computer program, then Newman necessarily anticipates "a program in the processor analyzing the image to detect predetermined features of the tubing segment" as argued by applicant.

In summary, the Newman reference read properly as a whole anticipates the broadly claimed requirements of claim 1.

Applicant's arguments regarding the dependent claims are the same as those related to claim 1 that has been addressed above.

103 McCoy and Gorria Combination:

Summary of Applicant's Remarks:

"There is no reasonable expectation that McCoy would be successful when combined with Gorria",

"Gorria would not be able to inspect coiled tubing at a well site where the amount of light shined on and thus reflected off of the coiled tubing varies throughout the procedure of injecting or removing the coiled tubing from the well", and

"the presence of well fluid residues can affect the amount of light reflected from the coiled tubing".

Examiner's Response: In response to applicant's argument that "Gorria would not be able to inspect coiled tubing at a well site where the amount of light shined on and thus reflected off of the coiled tubing varies throughout the procedure of injecting or

removing the coiled tubing from the well", the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981). The examiner contends that, given the McCoy and Gorria references and the suggestions and teaching therein, it would have been obvious to one of ordinary skill in the art to utilize image sensors and image processing software as taught by Gorria, in order to capture images and inspect the coiled tubing of McCoy for the presence of defects. Regarding the "lighting" differences between the Gorria environment and the "well" environment of McCoy, one of ordinary skill would have no problems making the combination work. As evidence of this, Newman (US 6,321,596 B1) has no problems measuring coiled tubing properties using captured images in the environment of deploying the tubing into and out of a well. Yes, the illumination of the McCoy and Gorria combination would require modifications. However, this is well within the capabilities of one of ordinary skill in the art. McCoy and Gorria is NOT A LITERAL COMBIANTION OF STRUCTURES. Rather, the teaching of Gorria is combined with McCoy. While the examiner has carefully considered applicant's arguments, the "Reasonable Expectation of Success" argument in this case is not convincing given the high level of skill in the art, and the fact that the prior art (e.g., Newman) teaches an image sensor for measuring coiled tubing properties in the same well environment that applicant is alleging is not possible.

103 McCoy and Puffer Combination:

Summary of Applicant's Remarks: "Neither McCoy nor Puffer teach or even suggest the requirement of claim 26 of an input device configured to received video signals and generate sequential images from the video input."

Examiner's Response: Disagreed. First, claim 26 requires "a input device configured to received video signals and generate sequential images from the video input" (i.e., at lines 5 and 6). The claim does not further define or limit the term "video", other than requiring "video signals" and "sequential images". A "video" signal is simply, and broadly, know in the art as a sequence of raster scanned images. This is exactly what Puffer teaches. That is, Puffer teaches a matrix type image sensor ("array or matrix" at column 5, line 38), where an image is raster scanned from the image sensor ("scanning raster for scanning the pixel outputs" at column 5,line 61), and where the process is repeated for a sequence of frames ("each scanning frame" at column 6, line 16). Thus, while Puffer does not use the term "video", the sequence of images scanned by Puffer fully meet the requirement of a video sequence.

Summary of Applicant's Remarks: "Also, Neither McCoy nor Puffer teach or even suggest the requirement of claim 26 of pattern classification software program configured to read the images generated by the input device and extract features from the images and compare the size of the features against a user-defined thresholds."

Examiner's Response: Disagreed. Puffer reads images (figure 2, numeral 45), extracts features from the images ("scanning the pixel outputs" at column 5, line 61;

"light signal for a respective pixel" at column 5, line 65; the light intensity of pixels represents features of the tubing being viewed), and compares feature sizes against user defined thresholds (Puffer discloses at least two thresholds that meet this requirement: First, the "intensity of the light signal for a respective pixel exceeds a threshold which is preselected" at column 5, line 65 and second, "preselected count ... indicative of a flaw" at column 6, line 3).

103 McCoy, Puffer and Kanzaka Combination:

Summary of Applicant's Remarks: The arguments related to the McCoy and Puffer Combination are repeated. The McCoy, Puffer and Kanzaka combination is not further argued per se.

103 Newman and Kanzaka Combination:

Summary of Applicant's Remarks: The arguments related to the Newman rejection are repeated. The Newman and Kanzaka combination is not further argued per se.

103 McCoy, Gorria and Endsley Combination:

Summary of Applicant's Remarks: The arguments related to the McCoy and Gorria rejection are repeated. The McCoy, Gorria and Endsley combination is not further argued per se.

103 McCoy, Gorria and Newman Combination:

Summary of Applicant's Remarks: Regarding each of these claims, the arguments related to the McCoy and Gorria rejection are repeated. The McCoy, Gorria and Newman combination is not further argued per se.

103 McCoy, Gorria and Greenwood Combination:

Summary of Applicant's Remarks: Regarding each of these claims, the arguments related to the McCoy and Gorria rejection are repeated. The McCoy, Gorria and Greenwood combination is not further argued per se.

103 McCoy, Gorria and Kanzaka Combination:

Summary of Applicant's Remarks: Regarding each of these claims, the arguments related to the McCoy and Gorria rejection are repeated. The McCoy, Gorria and Kanzaka combination is not further argued per se.

103 McCoy, Gorria and Chiu Combination:

Summary of Applicant's Remarks: Regarding each of these claims, the arguments related to the McCoy and Gorria rejection are repeated. The McCoy, Gorria and Chiu combination is not further argued per se.

103 McCoy, Gorria and Husseiny Combination:

Summary of Applicant's Remarks: Regarding each of these claims, the arguments related to the McCoy and Gorria rejection are repeated. The McCoy, Gorria and Husseiny combination is not further argued per se.

103 Newman and Husseiny Combination:

Summary of Applicant's Remarks: Regarding each of these claims, the arguments related to the Newman rejection are repeated. The Newman and Husseiny combination is not further argued per se.

103 Terry and Newman Combination:

Summary of Applicant's Remarks: Regarding each of these claims, the arguments related to the Newman rejection are repeated. The Terry and Newman combination is not further argued per se.

Differences vs. Patentable Distinctions

3. The claimed features are all anticipated or obvious over the prior art. Nothing in the currently recited claims is novel. The examiner suggests adding disclosed beneficial features of the invention that distinguish over the prior art to claim 1, and explaining how such features are in fact beneficial. Presently, many of the features argued by applicant as not being taught by the prior art are minor, incidental features that are no way (according to the examiner's reading of the disclosure) the defining features of the invention. For example, applicant argued above that the prior art does

not disclose a "frame grabber", or a "video sequence". While the examiner disagreed above, such features are not "the invention". If the use of a "video image" or a "frame grabber" is the "invention", an explanation of how these features provide a benefit over or other improve the prior art would be helpful to the examiner. Regarding patentable "differences" and "distinctions", there is a vast disconnect between a "difference" and a "distinguishing difference", or "patentable difference" between a claim and the prior art. Certainly, claims can be written and amended in many ways to recite differences. However, a patentable difference should be something that provides a benefit, or a criticality to applicant's invention to solve a problem over the prior art, or fulfill some long felt need, etc. If a "frame grabber" or a "video image" fulfills this criteria, neither the specification nor applicant's remarks have explained how; or have demonstrated a benefit or criticality heretofore not known. Should applicant feel that this feature is in fact the "distinguishing feature", or "the subject matter which the applicant regards as his invention or discovery" as required by Rule 75, examiner requests further clarification as to why, or how this is the case in order to better take a decision on patentability. The same holds for every other feature that applicant argues as not taught by the prior art. Until then, the examiner finds that all the broadly claimed features are met by the prior art as described above.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 2, 31, 36 and 38 are rejected under 35 U.S.C. 102(e) as being anticipated by Newman (US 6,31,596 B1).

Regarding claim 1, Newman discloses:

an imaging device ("optical scanning device(s), or with camera(s)" at column 3, line 45) recording video signals of a segment of coiled tubing as the tube is injected or removed from a well (as depicted in figure 3; "while it is being unspoiled and run into a bore hole" at column 3, line 23);

a conductor transmitting the signals to a processor (as depicted in figure 3, each of the sensors are connected to processor 210);

an image grabber generating an image of the tubing (figure 3, numeral 207; this is a data acquisition device and given that one of the sensors is a camera, the data acquisition device necessarily grabs frames, or images from the camera); and

a program in the processor (i.e., figure 3, numeral 210) analyzing the image to detect predetermined features of the tubing segment (images of a "visible line", or

"lines", or "dots" marked along the tubing length are captured and analyzed for "location" and "amount of rotation" of the tubing; i.e., "take discrete rotational measurement at one or a plurality of locations on a length of coiled tubing" at column 3, line 21).

Regarding claim 2, the coordinates of the tubing segment are generated ("locations" at column 3, line 45).

Regarding claim 31 and 36, the limitations therein are met by Newman as described in the claim 1 rejection above. Newman processes images from cameras of the stripes to determine rotation of the tube, among other things, "along the length of the coiled tubing" (column 4, line 26).

Regarding claim 38, Newman anticipates camera locations along a levelwind ("located anywhere ..." at column 6, line 47).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claim 1, 5-7, 9, 15, 17, 22, 23, 31-33, 37, 39 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McCoy et al. (US 5,767,671 A) and Gorria et al. (US 5,408,104 A).

Regarding each of the claims, McCoy discloses a system for surface inspection of a coiled tube being deployed by either injecting or removing it from a well (figure 4; "dents, wall thinning, cracks" are measured at column 5, line 33).

Regarding claims 9 and 32 specifically, a warning event is initiated (figures 3, numeral 56 and figure 5, "failure").

Regarding claim 33, a guide is disclosed (figures 1-3).

While McCoy is open to "any suitable type [of measurement apparatus] known in the art for taking the desired measurements" (column 5, line 36), McCoy does not teach an image processing measurement apparatus commensurate with the requirements of the claims.

Regarding each of the claims, Gorria discloses a system for inspecting an elongated tubular body in motion ("tubular product ... movable vertically" at column 7, lines 28 and 32), comprising plural imaging devices (figure 3), capturing images of the tubular circumferences and passing the images to a processor where the images are

processed by software (figure 1, numerals 18 and 19), and identifying predetermined features on the tubing ("scratches, cracks" at column 12, line 29 as well as other defects such as those listed at column 1, lines 60-64).

Regarding claim 17, three CCD cameras are disclosed (figure 2, numeral 9).

Regarding claim 23, a recorded is disclosed ("recording" at column 6, line 23).

Regarding claim 37 specifically, power is provided to the cameras and an illumination device (figures 1-3).

Regarding claims 5 and 39, the images are stored before processing ("acquisition card or board" at column 8, line 19; figure 5).

Regarding claim 41, size thresholds are disclosed ("threshold" at column 11, line 63; "too small" at column 2, line 9).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the image inspection taught by Gorria, to inspect the moving coil tubing as required by McCoy, in order to inspect for and detect the dents, thinning and cracks as called for by McCoy to "provide for quantitative measurement of the magnitude thereof and to suppress or considerably attenuate the influence of the general appearance of the surface to be monitored" (Gorria, column 1, line 35), thereby not taking into account "certain defects of dimensions which are to small to have an influence on the characteristics of use of the products" (Gorria, column 2, line 9). The effect of the Gorria system is to reduce the indication of false defects and thus providing an accurate surface inspection system.

8. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McCoy et al. (US 5,767,671 A) and Puffer (US 4,563,095 A).

McCoy discloses a system for surface inspection of a coiled tube as it is being deployed (figure 4; "dents, wall thinning, cracks" are measured at column 5, line 33).

While McCoy is open to "any suitable type [of measurement apparatus] known in the art for taking the desired measurements" (column 5, line 36), McCoy does not teach an image processing measurement apparatus commensurate with the requirements of claim 26.

Puffer discloses a system for inspecting an elongated tubular body in motion (figure 1, numeral 18), comprising:

a processor (figure 2, numeral 44);

an output device (figure 2, numeral 58);

image input device receiving sequential video images of the object (figure 1, numeral 38; Puffer teaches a matrix type image sensor ["array or matrix" at column 5, line 38], where an image is raster scanned from the image sensor ["scanning raster for scanning the pixel outputs" at column 5,line 61], and where the process is repeated for a sequence of frames ["each scanning frame" at column 6, line 16]);

pattern classifier extracting features ("scanning the pixel outputs" at column 5, line 61; "light signal for a respective pixel" at column 5, line 65; the light intensity of pixels represents features of the tubing being viewed) and comparing the size against user-defined thresholds (Puffer discloses at least two thresholds that meet this requirement: First, the "intensity of the light signal for a respective pixel exceeds a

threshold which is preselected" at column 5, line 65 and second, "preselected count ... indicative of a flaw" at column 6, line 3); and

where if the size does not fall within the threshold, an interrupt indicating that a defect as been located is generated ("output 55 to an annunciator or alarm 56 ... indicative of a flaw" at column 6, line 5).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the inspection technique of Puffer, in order to determine and detect flaws in the tubing of McCoy, in order to provide:

a "noncontact monitoring process which does not inhibit the speed" of the object (Puffer, column 1, line 41), thereby ensuring that further wear and tear of the tube is not caused by the measurement device and allowing tube deployment at regular speeds,

that can "detect different types of such irregularities ... anywhere about its periphery and along its length, and take appropriate corrective or preventative measures" (Puffer, column 1, line 35), thereby ensuring that defects can be found anywhere on the tube,

and which can prevent the indication of false defects ("falsely" at column 6, line 35) thus ensuring an accurate determination of defects.

Note: While the processor of Puffer (i.e., figure 2, numeral 44) is not explicitly disclosed as being computerized, given that the patent issued in 1986, it probably was. However, even if the process was not computerized (i.e., running on a processor under software control), it would have been obvious at the time the invention was made to one of ordinary skill in the art to program, in the McCoy and Puffer combination, the

computer of McCoy (i.e., McCoy figure 4, numeral 54) to perform the analytical functions of Puffer.

9. Claims 27-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McCoy et al. (US 5,767,671 A) and Puffer (US 4,563,095 A) as applied to claim 26 above, and further in combination with Kanzaka et al. (US 5,680,473 A).

The McCoy and Puffer combination does not receive location data indicating the position of a defect, generating the warning, and transmitting the image containing the defect and the location to the output device.

Kanzaka discloses a system for inspecting an elongated body in motion (figure 1, numeral 1; "surface inspection" at column 1,line 12), comprising receive location data indicating the position of a defect ("location thereof" at column 3, line 6), and transmitting the image containing the defect and the location to an output device ("based on a defect detection signal d ... the video signal v and the data D from the video processor unit 5 are mixed to provide a composing signal C which is delivered to a video signal recorder unit 8" at column 3, line 35).

Regarding claims 28 and 29, the output device of Kanzaka includes a monitor (figure 1, numeral 12) and a printer (figure 1, numeral 12).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to record the defect location and image each time the defect alarm is generated in the McCoy and Puffer combination as taught by Kanzaka, in order to

provide a permanent record of both the defect location and the defect image so that an operator can view and further classify the defects to ensure "an accurate judgment to the acceptance or rejection of the defect on the inspected object" as described by Kanzaka, at column 4, lines 26-38.

Regarding claim 30, the McCoy and Puffer combination does tech the classifier as recognizing unwanted defects and ignoring innocuous defects.

Kanzaka discloses his classifier as recognizing unwanted defects ("X marks ... cannot be overlooked" at column 3, line 18) and ignoring innocuous defects ("O marks ... may be ignored" at column 3, line 20).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to train the classifier of the McCoy and Puffer combination to distinguish between unwanted and innocuous defects as taught by Kanzaka, to further improve accuracy by flagging innocuous defects as such, and directing the operator's attention to more serious defects that could cause failure, and reduce the dowtime association with an operator having to review surface conditions that are not serious, and will not cause failure.

10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Newman (US 6,31,596 B1) and Kanzaka et al. (US 5,680,473 A).

While Newman discloses determining "locations from which the amount of rotation can be calculated ... electronically" (column 3, line 46), Newman does not disclose stamping the coordinates of the tube onto the image of the tube segment.

Kanzaka discloses a system for inspecting an elongated body in motion (figure 1, numeral 1; "surface inspection" at column 1,line 12), comprising receiving location data indicating a position of a defect ("location thereof" at column 3, line 6), and stamping the coordinates of the tube onto the image of the tube segment ("composing section 6, the video signal v and the data D ... are mixed to provide a composing signal C which is delivered to a video signal recorder" at column 3, line 37).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to mix the location coordinates and images of Newman as taught by Kanzaka in order to have a log of the actual images along with locations for future review and analysis of tube rotations, and to be able to pinpoint exactly where on the tubing defects are located for longevity analysis are repair/correction of the tubing.

11. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McCoy et al. (US 5,767,671 A) and Gorria et al. (US 5,408,104 A) as applied to claim 1 above, and further in combination with Endsley et al. (US 6,05,613 A).

While the McCoy and Gorria combination anticipates the use of a color matrix CCD cameras (Gorria, "matrix-type CCD camera" at column 12, line 54), the combination does not teach 640X480 resolution with 8 bits per color.

Endsley discloses an CCD camera comprising 640X480 resolution with 8 bits per color ("Kodak KAI-0320CM", "640 columns and 480 rows", "8-bit" at column 3, lines 26, 28 and 36).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the CCD camera taught by Endsley, as the CCD camera required by the McCoy and Gorria combination, in order to keep the system cost low by using a standard, commercially available and off-the-shelf camera, while providing a high quality 640X480 image to ensure an accurate inspection.

12. Claims 8, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McCoy et al. (US 5,767,671 A) and Gorria et al. (US 5,408,104 A) as applied to claim 6 above, and further in combination with Newman (US 6,31,596 B1).

Claims 8 and 25:

The McCoy and Gorria combination does not suggest "diameter" as one of the predetermined features for measurement.

Newman, in a system for determining defects and fatigue in a deploying coiled tubing, suggests the determination of "diameter" ("diameter" at column 4, line 21 and column 1, line 58).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to include a determination of diameter as suggested by Newman, as part of the coiled tube evaluation of the McCoy and Gorria combination, because "change in diameter" is an indicator of "deformations that can cause problems when using the coiled tubing" (Newman, column 1, line 60-62). This inclusion of a "diameter"

measurement in the McCoy and Gorria combination further serves to ensure an accurate determination of the tubing's condition.

Claim 24:

The McCoy and Gorria combination does not teach one or more stripes on the outer layer parallel with the longitudinal axis of the tubing.

Newman discloses a system in the same field of well digging, and same problem solving area of monitoring faults in tubing, where Newman teaches tubing with plural stripes ("tubing can be marked" and "series of visible lines is marked along the coiled tubing" which are marked "along its length" at column 3, lines 40-44) individually distinguishable from one another (the lines are "visible", and separate, and thus individually distinguishable).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to mark the tubing of the McCoy and Gorria combination, with the lines taught by Newman, in order to provide an indication for the measurement of "amount of rotation" (Newman, column 3, line 46) for "accurately determining coiled tubing fatigue life and/or deformation" (Newman, column 4, line 61) to ensure proper functioning of the tube, and avoid the cost associated with a tube's failure during a mining operation.

13. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McCoy et al. (US 5,767,671 A) and Gorria et al. (US 5,408,104 A) as applied to claim 15 above, and further in combination with Greenwood et al. (US 3,770,111 A).

While the McCoy and Gorria combination requires image capture devices around the periphery of the tubing, McCoy and Gorria do not teach the use of fiber optic image devices.

Greenwood discloses an optical inspection system wherein Greenwood teaches the use of fiber optic imaging devices ("fiber light guides" at column 3, line 58).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the fiber optic image devices of Greenwood, in order to capture the images required by the McCoy and Gorria combination, in order to "gather light over a much larger portion" of the tubing (Greenwood, column 4, line 1) with "a considerable decrease in optical complexity" (Greenwood, column 4, line 4), thereby providing an accurate and detailed image using a less complex, less prone to failure and lower cost image system.

14. Claims 18, 21, 34, 35 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McCoy et al. (US 5,767,671 A) and Gorria et al. (US 5,408,104 A) as applied to claims 15 and 31 above, and further in combination with Kanzaka et al. (US 5,680,473 A).

Regarding each of the claims, the McCoy and Gorria combination inspect and record defects along a length of tubing while in motion. Regarding claim 21 specifically, the McCoy and Gorria combination have a stacker (figure 5; "acquisition card or board" at column 8, line 19).

Regarding each of the claims, McCoy and Gorria do not teach a counter identifying a location along the tubing, where the computer reads the counter to identify the location at which a defect is found.

Regarding claims 34, 35 and 40 specifically, McCoy and Gorria do not teach displaying the images of the features, indicating the position of a defect in the tubing.

Kanzaka discloses a system for inspecting an elongated body in motion (figure 1, numeral 1; "surface inspection" at column 1,line 12), comprising receiving location data indicating a position of a defect ("location thereof" at column 3, line 6). Specifically, Kanzaka teaches a counter identifying a location along the tubing (figure 1, numeral 1'; "rotary encoder" at column 3, line 60), where the computer reads the counter ("to the video processor" at column 3, line 63) to identify the location at which a defect is found ("distance data will be contained in the data D" at column 3, line 6; "defect position" at column 4, line 10). Kanzaka stamps the coordinates of the tube onto the image of the tube segment ("composing section 6, the video signal v and the data D ... are mixed to

provide a composing signal C which is delivered to a video signal recorder" at column 3, line 37).

It would have been obvious at the time the invention was made to one of ordinary skill in the art provide and encoder and distance information taught by Kanzaka, to the computer of the McCoy and Gorria combination, in order to precisely note the location of the defect so that it can be further examined by an operator and/or repaired, and to provide data for the ultimate determination of the tube's life and possible failure modes.

15. Claims 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McCoy et al. (US 5,767,671 A) and Gorria et al. (US 5,408,104 A) as applied to claim 15 above, and further in combination with Chiu et al. (US 6,031,931 A).

The McCoy and Gorria combination inspect and record defects along a length of tubing while in motion. Regarding claim 21 specifically, the McCoy and Gorria combination have a stacker (figure 5; "acquisition card or board" at column 8, line 19).

Regarding each of the claims, McCoy and Gorria does not teach a counter identifying a location along the tubing, where the computer reads the counter to identify the location at which a defect is found.

Regarding claims 19 and 20 specifically, McCoy and Gorria do not teach disabling or enabling the inspection system based on sensor speed.

Chiu discloses a system for inspecting an elongated body in motion (figure 3), comprising a counter ("cycle detector" and "encoder" at column 6, line 5) receiving location data indicating a position of a defect ("position" at column 6, line 28) and

disabling or enabling the inspection system based on sensor speed ("beginning of a cycle" at column 6, line 6; "synchronize camera operation with movement" at column 6, line 37).

It would have been obvious at the time the invention was made to one of ordinary skill in the art provide the encoder and distance information taught by Chiu, to the computer of the McCoy and Gorria combination, in order to detect the "beginning" of inspection (Chiu, column 6, line 6) when the tube starts to move, to "synchronize camera operation with" the tube's movement (Chiu, column 6, line 37), and to precisely note the location of the defect so that it can be further examined by an operator and/or repaired, and to provide data for the ultimate determination of the tube's life and possible failure modes.

16. Claims 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of McCoy et al. (US 5,767,671 A) and Gorria et al. (US 5,408,104 A) as applied to claim 31 above, and further in combination with Husseiny (US 5,210,704 A).

The McCoy and Gorria combination does not teach identifying a feature as a defect by determining if a defect size has grown beyond a percentage of its original size.

Husseiny discloses a system in the field of defect inspection and failure analysis, comprising identifying a feature as a defect by determining if a defect size has grown beyond a percentage of its original size (figure 17).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to monitor defect growth on the coiled tubing of the McCoy and Gorria combination, and thereby identifying defects when a threshold has been reached as taught by Husseiny, in order to identify "incipient failures ... during operation" and provide an indication to the operation of the tube's "expected life" along with "a warning for the remaining time until failure of the equipment" (Husseiny, column 4, lines 40-54), thereby providing the operator with the ability to predict a failure before it actually occurs in order to take appropriate action and avoid costly losses during an operation.

17. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination Newman (US 6,31,596 B1) and Husseiny (US 5,210,704 A).

Newman does not teach identifying a feature as a defect by determining if a defect size has grown beyond a percentage of its original size.

Husseiny discloses a system in the field of defect inspection and failure analysis, comprising identifying a feature as a defect by determining if a defect size has grown beyond a percentage of its original size (figure 17).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to monitor defect growth on the coiled tubing of Newman, and thereby identifying defects when a threshold has been reached as taught by Husseiny, in order to identify "incipient failures ... during operation" and provide an indication to the operation of the tube's "expected life" along with "a warning for the remaining time until failure of the equipment" (Husseiny, column 4, lines 40-54), thereby providing the

operator with the ability to predict a failure before it actually occurs in order to take appropriate action and avoid costly losses during an operation.

18. Claims 13, 14 and 43-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Terry et al. (US 6,296,066 B1) and Newman (US 6,31,596 B1).

Claims 13 and 14

Regarding claim 13, Newman discloses an image device, processor and program as described in the rejections above. Newman discloses the deployment and measurement of rotation of coiled tubing having longitudinal stripes (refer to the rejections above).

Regarding claim 14, Newman's stripes are "visible" to the cameras, and are thus a predetermined color. Newman analyzes the images of the stripes to determine tube rotation, and thus detects the stripes as called for by the claim.

Regarding claims 13 and 14, Newman does not teach a composite coiled tubing having layers of fibers form the tubing wall (as required by claim 13 directly, and claim 14 by dependency).

Terry teaches a coiled tubing for deployment into a well, the tubing comprising a composite coiled tubing (figures 2 and 3) having layers of fibers form the tubing wall ("fiber" at column 10, line 32).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the tubing taught by Terry, as the tubing required by Newman,

because it is "very strong" and "resistant to abrasion" (Terry, column 10, line 28), thus preventing premature wear and failure due to continuous deployment into and out of wells.

Claim 43-45

Regarding each of the claims, Newman discloses a system for monitoring faults in a coiled tubing, where Newman teaches tubing with plural stripes ("tubing can be marked" and "series of visible lines is marked along the coiled tubing" which are marked "along its length" at column 3, lines 40-44) individually distinguishable from one another (the lines are "visible", and separate, and thus individually distinguishable).

Regarding claim 43 directly, and claims 44 and 45 by dependency, Newman does not disclose the coiled tubing as comprising: an outer wear layer; and a contrasting layer beneath the wear layer; wherein if the outer wear layer is worn away, the contrasting layer becomes visible as a contrasting feature on the tubing.

Terry discloses a coiled tubing (figure 1, numeral 20) comprising: an outer wear layer ("wear layer 36" at column 10, line 22); and a contrasting layer beneath the wear layer ("underlying load carrying layers 34" at column 10, line 27); wherein if the outer wear layer is worn away, the contrasting layer becomes visible as a contrasting feature on the tubing (the wear layer "can be of a different fiber and color making it easy to determine the wear locations" at column 10, line 33).

It would have been obvious at the time the invention was made to one of ordinary skill in the art to utilize the coiled tubing taught by Terry, as the tubing for well deploying

and monitoring require by Newman, in order to make it "easy to determine the wear locations" (Terry, column 10, line 33).

Conclusion

19. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

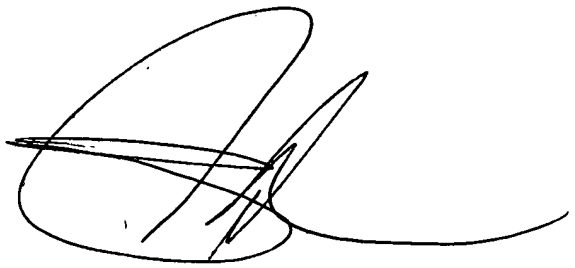
20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian P. Werner whose telephone number is 703-306-3037. The examiner can normally be reached on M-F, 8:00 - 4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo H. Boudreau can be reached on 703-305-4706. The fax phone numbers for the organization where this application or proceeding is assigned are 703-

872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4750.

Brian Werner
Primary Examiner
July 21, 2003



BRIAN WERNER
PRIMARY EXAMINER